

CLAIM AMENDMENTS

1. (Currently Amended) A noble metal tip for use with a spark plug electrode, comprising:

a firing end having a sparking surface,

an attachment end, and ~~and~~;

a retention feature extending generally radially inwardly into said noble metal tip at a location that is adjacent said attachment end, ~~wherein said noble metal tip is capable of being inserted into a bore located in either a spark plug center and/or ground electrode such that said sparking surface is located outside of the bore and said retention feature is located within the bore.~~

2. (Currently Amended) The noble metal tip of claim 1, wherein said noble metal tip has a diameter. ~~attachment end includes a tapered section.~~

3. (Currently Amended) The noble metal tip of claim 2, ~~claim 1~~, wherein said retention feature radially extends only partially through the diameter of said noble metal tip.

4. (Original) The noble metal tip of claim 3, wherein said retention feature is of a generally conical shape.

5. (Currently Amended) The noble metal tip of claim 3, wherein said retention feature comprises ~~includes~~ a groove that extends around the entire circumference of said noble metal tip.

6. (Currently Amended) The noble metal tip of claim 3, ~~claim 1~~, wherein said retention feature comprises a hole extending inwardly into said noble metal tip. ~~includes a diameter that is between 0.05mm-0.3mm.~~

7. (Currently Amended) The noble metal tip of claim 1, wherein said retention feature radially extends into said noble metal tip by a distance that is less than one half of the diameter of said noble metal tip. ~~between 0.05mm-0.3mm.~~

8. **(Currently Amended)** The noble metal tip of claim 1, wherein said tip further comprises a plurality of said retention features, and wherein one or more of said features are located at a first axial position along said tip and one or more of said features are located at a second axial position along said tip, said first and second axial positions being ~~are~~ spaced from one another.

9. **(Original)** The noble metal tip of claim 8, wherein first and second retention features are located at said first axial position and are circumferentially spaced from one another by approximately 180°, and third and fourth retention features are located at said second axial position and are circumferentially spaced from one another by approximately 180°.

10. **(Currently Amended)** The noble metal tip of claim 9, wherein said retention features comprise holes extending inwardly into said noble metal tip. ~~first and third retention features are circumferentially spaced by approximately 90°, said third and second retention features are circumferentially spaced by approximately 90°, said second and fourth retention features are circumferentially spaced by approximately 90°, and said fourth and first retention features are circumferentially spaced by approximately 90°.~~

11. **(Original)** The noble metal tip of claim 1, wherein said noble metal tip is comprised of an Ir-based material.

12. **(Original)** An electrode assembly including the noble metal tip of claim 1.

13. **(Original)** A spark plug including the electrode assembly of claim 12.

14. **(Currently Amended)** A center electrode assembly for use in a spark plug, comprising:

a center electrode component including a front end having a blind bore formed therein,

a generally cylindrical noble metal tip secured within said blind bore, said tip including:

a firing end having a sparking surface,

an attachment end located within said blind bore, and ~~and~~;
a retention feature, and ~~and~~;
a fusion ~~layer~~; layer that extends into said retention feature and locks said
noble metal tip to said center electrode.
~~wherein said retention feature receives at least a portion of said fusion~~
~~layer such that said noble metal tip is secured within said blind bore.~~

15. **(Currently Amended)** The center electrode assembly of claim 14, wherein said tip further comprises a plurality of said retention features, and wherein one or more of said features are located at a first axial position along said tip and one or more of said features are located at a second axial position along said tip, said first and second axial positions being ~~are~~ spaced from one another.

16. **(Currently Amended)** The center electrode assembly of claim 14, wherein said sparking surface protrudes beyond the end of said center electrode ~~tapered~~ front end by a distance between 0.1mm-1.0mm.

17. **(Original)** The center electrode assembly of claim 14, wherein said sparking surface has a diameter between 0.25mm-1.0mm.

18. **(Original)** The center electrode assembly of claim 14, wherein said noble metal tip is comprised of an Ir-based material.

19. **(Original)** The center electrode assembly of claim 14, wherein said center electrode component is comprised of a nickel-based material having a thermal conductivity of greater than 30 W/mK during normal spark plug operating temperatures.

20. **(Original)** A spark plug including the center electrode assembly of claim 14.

21-26. **(Canceled)**

27. **(New)** The center electrode assembly of claim 14, wherein said retention feature radially extends only partially through the diameter of said noble metal tip.

28. (New) The center electrode assembly of claim 27, wherein said retention feature is of a generally conical shape.

29. (New) The center electrode assembly of claim 27, wherein said retention feature comprises a groove that extends around the entire circumference of said noble metal tip.

30. (New) The center electrode assembly of claim 27, wherein said retention feature comprises a hole extending inwardly into said noble metal tip.

31. (New) The center electrode assembly of claim 14, wherein said retention feature radially extends into said noble metal tip by a distance that is less than one half of the diameter of said noble metal tip.

32. (New) The center electrode assembly of claim 14, further comprising a plurality of said retention features, wherein first and second retention features are located at a first axial position and are circumferentially spaced from one another by approximately 180°, and third and fourth retention features are located at a second axial position and are circumferentially spaced from one another by approximately 180°.

33. (New) An electrode assembly for a spark plug, comprising:
an electrode;
a noble metal tip having an attachment end and a firing end that includes a sparking surface, said attachment end being recessed into said electrode;
wherein said noble metal tip includes one or more retention features extending inwardly into said tip from a peripheral surface of said tip at a location intermediate said attachment end and said firing end; and
wherein said tip is locked to said electrode by material from said electrode that extends into said one or more retention features.

34. (New) The electrode assembly of claim 33, wherein said electrode comprises a center electrode.

35. (New) The electrode assembly of claim 33, wherein said one or more retention features comprises a plurality of holes including first and second holes angularly spaced from each other about said peripheral surface of said tip.

36. (New) The electrode assembly of claim 35, wherein said first and second holes are located at a common axial position on said tip.

37. (New) The electrode assembly of claim 35, wherein said first and second holes are axially spaced from each other.

38. (New) The electrode assembly of claim 35, wherein said plurality of holes comprises four holes.

39. (New) An electrode assembly for a spark plug, comprising:
a center electrode;
a noble metal tip having an attachment end and a firing end that includes a sparking surface, said attachment end being recessed into said center electrode;
wherein said noble metal tip includes one or more retention features extending inwardly into said tip from a peripheral surface of said tip at a location intermediate said attachment end and said firing end; and
wherein said tip is secured to said center electrode by a fusion layer that extends into said one or more retention features.

40. (New) The electrode assembly of claim 39, wherein said fusion layer includes only material from said center electrode, whereby said tip is locked to said center electrode.

41. (New) The electrode assembly of claim 39, wherein said tip is welded to said center electrode by said fusion layer, whereby said fusion layer includes material from both said tip and said center electrode.

42. (New) A method of manufacturing a spark plug electrode assembly, said method comprising the steps of:
(a) providing a noble metal wire;

- (b) providing an electrode;
- (c) forming one or more retention features into said noble metal wire;
- (d) inserting an end of said noble metal wire into a recess in said electrode;
- and
- (e) melting a portion of said electrode at said recess so that molten electrode material flows into said retention features.

43. (New) The method of claim 42, wherein said noble metal wire is an iridium-based wire and wherein step (c) further comprises forming a plurality of holes in said iridium-based wire.

44. (New) The method of claim 42, wherein step (e) further comprises melting said portion of said electrode using a laser.

45. (New) A method of manufacturing a spark plug electrode assembly, said method comprising the steps of:

- (a) providing a noble metal wire;
- (b) providing an electrode;
- (c) forming one or more retention features into said noble metal wire;
- (d) inserting an end of said noble metal wire into a recess in said electrode;
- and
- (e) forming a fusion layer that extends into said one or more retention features and locks said noble metal wire to said electrode.

46. (New) The method of claim 45, wherein said noble metal wire is an iridium-based wire and wherein step (c) further comprises forming a plurality of holes in said iridium-based wire.

47. (New) The method of claim 45, wherein step (e) further comprises forming said fusion layer by melting a portion of said electrode using a laser.